Aboriginal Affairs and Northern Development Canada
Affaires autochtones et Développement du Nord Canada

Nunavut Regional Office (NRO)
P.O. Box 2200
Iqaluit, NU, X0A 0H0

July 29, 2015

Thomas Kabloona
Nunavut Water Board, Chair
P.O. Box 119, Gjoa Haven,
Nunavut, X0B 1J0

Dear Mr. Thomas Kabloona:

RE: Nottingham Island Water Use Licence (1BR NIR1419) – Condition: Part K Item 2 met

One of the conditions attached to the Aboriginal Affairs and Northern Development Canada (AANDC)'s water licence 1BR NIR 1419 issued on February 17, 2014 for the remediation of Nottingham Island Site is "to submit for approval a proposal for the development of a Surface Water Monitoring Plan (SWMP)" (Part K Item 2).

According to the water licence (General considerations section H: Monitoring), this condition was included because a preliminary surface water monitoring program performed at site during the Phase III ESA (EBA, January 2013) indicated water concentrations above natural background levels and in exceedance of the CCME guidelines for water. The identified exceedances (copper, aluminium, lead, selenium, zinc, silver, fluoride and chloride) are based upon a single limited data set and are potentially a result of naturally occurring background conditions, or may be a result from Site operations. The NWB considers that further surface water monitoring shall be conducted to determine the origin of this impact.

AANDC conducted additional surface water sampling at the site on August 19, 2013 to ascertain the quality and the source of any surface water impact. Please refer to the attached memo titled ***"Nottingham Island Site Remediation – August 2013 Surface Water Sampling Results".*** The results showed that no impact on surface water came from site use. They also show that most parameters observed are below applicable criteria and those that are above criteria (e.g. copper) have no health objective but aesthetic objective. With these results, AANDC is informing the Board that the condition Part K Item 2 is met and no further SWMP is required. AANDC will, however, conduct ongoing monitoring at the Monitoring Program Stations specified in Part K Item 3 of the water licence.

If you have any questions or comments, please contact the undersigned or the Project Manager, Dele Morakinyo at dele.morakinyo@aandc-aadnc.gc.ca, or by telephone at (819) 934-9224

Sincerely,

Charlotte Lamontagne
A/Director, Lands and Contaminated Sites (NRO)
Tel: (867) 975-4578;
Fax: (867) 975-4736
Email: charlotte.lamontagne@aandc-aadnc.gc.ca

CC: Nunavut Impact Review Board (NIRB), Cambridge Bay, Nunavut

Canada

KGS GROUP CONSULTING ENGINEERS

MEMORANDUM

TO: **Jessie Hoyt, PWGSC**

FROM: **Ed Collins**

DATE: **September 20, 2013**

PROJECT NO: **13-0163-001**

RE: Nottingham Island Site Remediation – August 2013 Surface Water Sampling Results

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BACKGROUND

As per PWGSC's request, the following is a brief overview of the results from the surface water sampling undertaken on August 19th, 2013 during the Optional Pre-Bidder's Tour of the subject site, the Former Weather & Radio Stations on Nottingham Island, Nunavut.

An Optional Pre-Bidder's Tour of the site was scheduled for August 19th, 2013 for prospective bidders to view the site conditions and potential work. PWGSC provided air transportation for all participants, including one Dillon-KGS Group field personnel, to the site and return from Iqaluit.

One field personnel from KGS Group attended the August 19th, 2013 site tour, representing the Dillon-KGS Group project team, to conduct surface water sampling of potential water sources during the site visit.

METHODOLOGY

A total of 11 surface water samples were collected using a dedicated reacher pole and laboratory provided sample bottles throughout the site at locations specified by the client, including two blind field duplicates. Samples were collected at both Lake 2 and Lake 4, potential water sources for the future on-site contractor. Under the direction of PWGSC, no surface water samples were collected from Lake 1 since it was determined it would not be a feasible water source for the on-site contractor.

All 11 surface water samples were submitted on August 20th, 2013 to the Iqaluit Analytical Services Unit (IASU) laboratory in Iqaluit, a satellite operation of the Analytical Services Unit (ASU) at Queen's University in Kingston, Ontario. IASU ensured that all Chain of Custodies were completed, packaged the samples and had them sent to Paracel Laboratories Ltd. in Ottawa, Ontario for analysis. The samples were all submitted for laboratory analysis of: benzene, toluene, ethylbenzene, xylenes (BTEX) and petroleum hydrocarbon fractions (PHC) F1 to F4, general water quality and potable water analysis (HC-CDWQ criteria) and total metals.

Samples NOTT-SW-004 and NOTT-SW-005 were collected from Lake 4 and samples NOTT-SW-007, NOTT-SW-008 and NOTT-SW-010 were collected from Lake 2. Lakes 4 and 2 were previously identified by EBA – A Tetra Tech Company, as potential water sources. The six remaining samples were collected from small ponds near the buildings on-site.

RESULTS

Laboratory results were tabulated against applicable CCME and/or HC-CDWQ criteria and are attached at Tables 1 through 3. Laboratory results indicated that concentrations of BTEX and PHC Fractions F1 to F4 were below CCME criteria for Freshwater Aquatic Life and HC-CDWQ criteria for Drinking Water Quality in all 11 surface water samples (Table 1).

Potential Drinking Water Sources:

A) Petroleum Hydrocarbon Results

Laboratory results indicated that concentrations of BTEX and PHC Fractions F1 to F4 were below CCME criteria for Freshwater Aquatic Life and HC-CDWQ criteria for Drinking Water Quality in all five surface water samples (NOTT-SW-004, NOTT-SW-005, NOTT-SW-007, NOTT-SW-008 and NOTT-SW-010) collected from the potential water sources, Lakes 2 and 4. Results are illustrated in Table 1.

B) General Water Quality Results

General water quality results, including drinking water parameters, are illustrated in Table 2. Laboratory results identified concentrations of *E.coli* above HC-CDWQ guidelines in samples NOTT-SW-004 (Lake 4), NOTT-SW-005 (Lake 4) and NOTT-SW-010 (Lake 2). Laboratory results identified non-detectable concentrations of *E. coli* in samples NOTT-SW-007 and NOTT-SW-008, both collected from Lake 2. Laboratory results identified concentrations of Total Coliform in exceedence of HC-CDWQ criteria in samples NOTT-SW-005, NOTT-SW-007, NOTT-SW-008 and NOTT-SW-010. Sample NOTT-SW-004 hold time was exceeded and no results were reported by the laboratory.

C) Metals Results

Colour concentrations reported in T.C.U. (true colour units) were in exceedence of the HC-CDWQ Drinking Water criteria (aesthetic objective) in sample NOTT-SW-004 (Lake 4). Colour concentrations were below applicable criteria in samples NOTT-SW-005, NOTT-SW-007, NOTT-SW-008 and NOTT-SW-010. Turbidity concentrations above HC-CDWQ Drinking Water criteria for maximum acceptable concentration were identified in all five surface water samples collected from the potential drinking water sources (Lakes 2 and 4). Fluoride concentrations above CCME – Freshwater Aquatic Life criteria (0.12 mg/L) were identified in samples NOTT-SW-004 and NOTT-SW-005, both collected from Lake 4, but were below HC-CDWQ Drinking Water criteria (1.5 mg/L; Table 2). Fluoride concentrations in the other three water samples collected from the potential drinking water sources were below applicable criteria.

Laboratory results identified copper concentrations above HC-CDWQ Drinking Water and CCME Freshwater Aquatic Life criteria in samples NOTT-SW-004 and NOTT-SW-005 (both from Lake 4). It should be noted that HC-CDWQ criteria for copper is strictly an aesthetic objective and not a health objective. Copper concentrations in the remaining three potential drinking water sources samples were below applicable criteria. All other laboratory results for metal parameters were below applicable CCME and HC-CDWQ criteria for the five samples collected from potential drinking water sources and are illustrated in Table 3.

Ponded Water near Buildings:
Six surface water samples were collected from various ponded water locations near the on-site buildings.

A) Petroleum Hydrocarbon Results

Laboratory results indicated that concentrations of BTEX and PHC Fractions F1 to F4 were below CCME criteria for Freshwater Aquatic Life and HC-CDWQ criteria for Drinking Water Quality in all six surface water samples collected from various ponded water locations near the on-site buildings. Results are illustrated in Table 1.

B) General Water Quality Results

General water quality results, including drinking water parameters, are illustrated in Table 2. Laboratory results identified concentrations of *E.coli* above HC-CDWQ guidelines in five of the six samples collected near the on-site buildings with the exception of sample NOTT-SW-011. Sample NOTT-SW-011 exceeded holding time. Laboratory results identified concentration of Total Coliform in exceedence of HC-CDWQ criteria in sample NOTT-SW-003. The remaining five surface water samples collected from ponded water near the on-site buildings either exceeded holding time and/or no data was available.

C) Metals Results

Colour concentrations reported in T.C.U. (true colour units) were in exceedence of the HC-CDWQ Drinking Water criteria (aesthetic objective) in all six samples collected from ponded water near the on-site buildings. Turbidity concentrations above HC-CDWQ Drinking Water criteria for maximum acceptable concentration were identified in all six surface water samples collected from ponded water near the on-site buildings. Fluoride concentrations above CCME – Freshwater Aquatic Life criteria (0.12 mg/L) were identified in three samples collected from ponded water near the on-site buildings (NOTT-SW-001, NOTT-SW-002 and NOTT-SW-003), but were below HC-CDWQ Drinking Water criteria (1.5 mg/L; Table 2). Fluoride concentrations in the other two water samples collected from ponded water near the on-site buildings were below applicable criteria.

Laboratory results identified copper concentrations above HC-CDWQ Drinking Water and CCME Freshwater Aquatic Life criteria in samples NOTT-SW-001 and NOTT-SW-002. It should be noted that HC-CDWQ criteria for copper is strictly an aesthetic objective and not a health objective. Copper concentrations in the remaining four surface water samples collected from ponded water near the on-site buildings were below applicable criteria.

Zinc concentrations above HC-CDWQ Drinking Water (aesthetic objective) and CCME Freshwater Aquatic Life criteria were identified in two of the six water samples collected from ponded water near the on-site buildings (NOTT-SW-001 and NOTT-SW-002). All other zinc concentrations were below applicable guidelines. All other laboratory results for metal parameters were below applicable CCME and HC-CDWQ criteria for the six water samples collected from ponded water near the on-site buildings and are illustrated in Table 3.

CONCLUSION

Based on the laboratory results of the August 19th, 2013 surface water sampling conducted at the Former Weather and Radio Stations on Nottingham Island, Nunavut, the natural surface waters are not expected to impact on-site remedial activities. *E.coli* and Total Coliform concentrations were detected in both potential water sources (Lakes 2 and 4) warranting an on-site filtration set up by the contractor. Elevated copper and zinc concentrations illustrated in Table 3 are predominantly aesthetic objectives and should not impede any remedial objectives.

TABLES

TABLE 1
PETROLEUM HYDROCARBONS IN SURFACE WATER
NOTTINGHAM ISLAND - FORMER WEATHER & RADIO STATIONS, NUNAVUT

Sample ID	Date	Parameter [1]							
		Benzene	Toluene	Ethyl-benzene	Xylenes (-o,-m,-p)	F1 (C6 - C10)	F2 (C10 - C16)	F3 (C16 - C34)	F4 (C34 - C50)
NOTT-SW-001	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-002	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-003	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-004	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-005	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-006	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-007	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-008	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-009	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-010	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
NOTT-SW-011	19-Aug-13	<0.5	<0.5	<0.5	<0.5	<25	<100	<100	<100
HC-CDWQ [3]									
Drinking Water Quality		5 (MAC)	24 (AO)	2.4 (AO)	300 (AO)	-	-	-	-
CCME [2]									
Freshwater Aquatic Life		370	2	90	-	-	-	-	-

Notes:
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.
"-" = No Data

1. All concentrations in micrograms per litre (µg/L).
2. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines 1999. Updated November 2012.
   Chapter 2 - Community Water
   Chapter 4 - Aquatic Life
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.

	- Exceedance of HC-CDWQ Criteria
BOLD	- Exceedance of CCME Criteria

TABLE 2
GENERAL SURFACE WATER QUALITY
NOTTINGHAM ISLAND - FORMER WEATHER & RADIO STATIONS, NUNAVUT

Sample ID	Date	Parameters [1]																		
		Colour (T.C.U.)	Turbidity (NTU) [11]	pH (units)	E.C. (µS/cm)	Alkalinity as $CaCO_3$	Bicarbonate as $CaCO_3$	Carbonate as $CaCO_3$	Fluoride	Chloride	Nitrite	Nitrate	Sulphate	B.O.D. [13]	C.O.D.	D.O.C	Free Cyanide	T.D.S.	T.S.S.	T.O.C.	E. Coli (CFU/100 mL) [11]	Total Coliform (1 CFU/100mL) [11]
NOTT-SW-001	19-Aug-13	28	2.3	7.6	115	36	35	<5	**0.13**	8.31	<0.05	0.07	6.69	<4	76	4	<0.002	81	10	4.1	3	[11]
NOTT-SW-002	19-Aug-13	28	1.9	7.5	108	33	32	<5	**0.12**	8.28	<0.05	2.15	7.47	<6	16	4.5	<0.002	62	2	4.6	5	[11]
NOTT-SW-003	19-Aug-13	27	0.4	7.9	237	94	93	<5	**0.14**	11.09	<0.1	<0.1	8.96	<6	13	4.8	<0.002	121	<2	4.8	40	61
NOTT-SW-004	19-Aug-13	20	0.8	8	208	79	78	<5	**0.14**	10.93	<0.1	<0.1	9.52	<6	16	5	<0.002	108	<2	5.1	123	[11]
NOTT-SW-005	19-Aug-13	15	0.9	7.9	204	74	73	<5	**0.15**	11.80	<0.1	<0.1	9.70	<4	80	5.2	<0.002	115	2	5.3	25	49
NOTT-SW-006	19-Aug-13	39	0.9	8	269	113	111	<5	<0.1	11.89	<0.1	<0.1	8.23	<6	24	7.7	<0.002	143	<2	8.2	>200	[11]
NOTT-SW-007	19-Aug-13	14	0.5	8.1	351	98	97	<5	<0.1	39.39	<0.1	<0.1	15.83	<4	<10	4	<0.002	174	<2	4	ND	3
NOTT-SW-007 (lab duplicate)	19-Aug-13	-	-	-	-	-	-	-	<0.1	37.99	<0.1	<0.1	14.83	-	-	-	-	-	-	-	-	-
NOTT-SW-008	19-Aug-13	15	0.5	8.1	352	99	98	<5	<0.1	38.59	<0.1	0.47	17.00	<2	<10	4	<0.002	176	<2	4.3	ND	5
NOTT-SW-009	19-Aug-13	27	1.6	8.2	366	158	156	<5	<0.1	15.76	<0.1	<0.1	11.38	<4	15	6	<0.002	188	10	6.5	83 [12]	
NOTT-SW-010	19-Aug-13	13	0.5	8	352	99	98	<5	<0.1	38.55	<0.1	<0.1	15.24	<2	<10	3.8	<0.002	163	<2	3.9	1	15
NOTT-SW-011	19-Aug-13	34	2.1	8.3	297	126	124	<5	<0.1	12.59	<0.1	<0.1	8.66	<4	20	6.6	<0.002	166	<2	7	[11]	[11]
HC-CDWQ [2]																						
Drinking Water		15 (AO)	0.3/1.0/0.1 (MAC)[4]	6.5 - 8.5 (AO)	-	-	-	-	1.5 (MAC)	≤250 (AO)	3.2 [5] (MAC)	45 [5] (MAC)	500 (AO)	-	-	-	0.2 (MAC)	500 (AO)	[5]	-	None Detectable per 100 mL (MAC) [6]	None Detectable per 100 mL (MAC) [7]
CCME / Health Canada [3]																						
Freshwater Aquatic Life		Narrative [8]	Narrative [9]	6.5 - 9.0	-	-	-	-	0.12	120[10a]/640 [10b]	-	-	-	-	-	-	0.005	-	[5]	-	-	-

Notes:
"-" = No Data
E.C. = Electrical Conductivity
B.O.D. = Biochemical Oxygen Demand
C.O.D. = Chemical Oxygen Demand
D.O.C. = Dissolved Organic Carbon
ND = Not Detected
T.C.U. = True Colour Unit
T.O.C. = Total Organic Carbon
T.D.S. = Total Dissolved Solids
T.S.S. = Total Suspended Solids

1. All values are expressed in milligrams per litre (mg/L) unless indicated otherwise.
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
MAC - Maximum Acceptable Concentration
AO - Aesthetic Objectives
3. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated November 2012.
Guidelines for Canadian Drinking Water Quality.
Chapter 2 - Community Water (Health Canada - Canadian Drinking Water Quality Guidelines)
Chapter 4 - Aquatic Life
4. Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet the following health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters:
a) For chemically assisted filtration, shall be less than or equal to 0.3 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 1.0 NTU at any time.
b) For slow sand or diatomaceous earth filtration, shall be less than or equal to 1.0 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 3.0 NTU at any time.
c) For membrane filtration, shall be less than or equal to 0.1 NTU in at least 99% of the measurements made, or at least 99% of the time each calendar month, and shall not exceed 0.3 NTU at any time. If membrane filtration is the sole treatment technology employed, some form of virus inactivation* should follow the filtration process.
Turbidity values greater than 1 NTU are shaded.
5. Suspended Sediments Guideline (see Total Particulate Matter fact sheet for complete details):
Clear Flow:
Maximum increase of 25 mg/L from background levels for any short-term exposure (eg. 24 hr period).
Maximum average increase of 5 mg/L from background levels for longer term exposures (eg. inputs lasting between 24 hrs and 30 days).
High Flow:
Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L.
Should not increase more than 10% of background levels when background is >250 mg/L.
6. The maximum acceptable concentration (MAC) of *Escherichia coli* in public, semi-public, and private drinking water systems is none detectable per 100 mL.
Testing for *E. coli* should be carried out in all drinking water systems. The number, frequency, and location of samples for *E. coli* testing will vary according to the type and size of the system and jurisdictional requirements.
7. The MAC of total coliforms in water leaving a treatment plant in a public system and throughout semi-public and private supply systems is none detectable per 100 mL.
For distribution systems in public supplies where fewer than 10 samples are collected in a given sampling period, no sample should contain total coliform bacteria.
In distribution systems where greater than 10 samples are collected in a given sampling period, no consecutive samples from the same site or not more than 10% of samples should show the presence of total coliform bacteria.
Testing for total coliforms should be carried out in all drinking water systems. The number, frequency, and location of samples for total coliform testing will vary according to the type and size of the system and jurisdictional requirements.
8. Colour Guidelines (see fact sheet for complete details):
True Colour: The mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
Apparent Colour: The mean percent transmission of white light per metre shall not be significantly less than the seasonally adjusted expected value for the system under consideration.

9. Turbidity Guidelines (see fact sheet for complete details):
Clear Flow:
Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g. 24 hr period).
Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g. 30 day period).
High Flow or Turbid Waters:
Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs.
Should not increase more than 10% of background levels when background is >80 NTUs.
10. Chloride toxicity to freshwater organisms was evaluated using tests with both $CaCl_2$ and NaCl salts.
   a. Long-term exposure - May not be protective of certain species of endangered and special concern freshwater mussels. Refer to fact sheet for more explanation
   b. Short-term exposure - derived with severe-effect data (such as lethality) and are not intended to protect all components of aquatic ecosystem structure and function but rather to protect most species against lethality during severe but transient events. Refer to fact sheet for more information.
11. Holding time had been exceeded.
12. Confluent background colonies on filter: may interfere with target reactions and the analysts' ability to count E. coli and Total Coliform.
13. Raised Reporting Limits for BOD due to dilutions based on preliminary COD screening results.

	- Exceedance of HC-CDWQ Guidelines
Bold	- Exceedance of CCME Guidelines

TABLE 3
METALS IN SURFACE WATER
NOTTINGHAM ISLAND - FORMER WEATHER & RADIO STATIONS, NUNAVUT

Sample ID	Date	Parameter [1]																													
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Selenium	Silver	Sodium	Strontium	Sulfur	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc
NOTT-SW-001	19-Aug-13	0.089	<0.001	<0.003	0.019	<0.003	<1	0.000036	9.8	<0.001	<0.003	6.7	<0.2	<0.001	2.1	<0.005	<0.005	<0.005	<1	1.1	<0.001	<0.0001	11	0.037	2.5	<0.0008	<0.005	<0.005	<0.01	<0.003	**7.3**
NOTT-SW-002	19-Aug-13	<0.050	<0.001	<0.003	0.018	<0.003	<1	0.000035	11	<0.001	<0.003	7.8	<0.2	<0.001	2.1	<0.005	<0.005	<0.005	<1	<1	<0.001	<0.0001	14	0.037	2.6	<0.0008	<0.005	<0.005	<0.01	<0.003	**8.4**
NOTT-SW-003	19-Aug-13	<0.050	<0.001	<0.003	0.03	<0.003	<1	<0.000017	29	<0.001	<0.003	<0.002	<0.2	<0.001	4.4	<0.005	<0.005	<0.005	<1	1.2	<0.001	<0.0001	15	0.14	3.6	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-004	19-Aug-13	0.058	<0.001	<0.003	0.026	<0.003	<1	<0.000017	24	<0.001	<0.003	2.0	<0.2	<0.001	3.7	<0.005	<0.005	<0.005	<1	1.1	<0.001	<0.0001	14	0.12	3.1	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-005	19-Aug-13	<0.050	<0.001	<0.003	0.03	<0.003	<1	<0.000017	24	<0.001	<0.003	2.0	<0.2	<0.001	3.8	<0.005	<0.005	<0.005	<1	1.3	<0.001	<0.0001	14	0.12	3.5	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-006	19-Aug-13	<0.050	<0.001	<0.003	0.074	<0.003	<1	<0.000017	37	<0.001	<0.003	<0.002	<0.2	<0.001	4.8	<0.005	<0.005	<0.005	<1	<1	<0.001	<0.0001	14	0.19	2.7	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-007	19-Aug-13	<0.050	<0.001	<0.003	0.055	<0.003	<1	<0.000017	27	<0.001	<0.003	<0.002	<0.2	<0.001	6.2	<0.005	<0.005	<0.005	<1	2.5	<0.001	<0.0001	39	0.24	5.4	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-008	19-Aug-13	0.1	<0.001	<0.003	0.05	<0.003	<1	<0.000017	25	<0.001	<0.003	<0.002	<0.2	<0.001	5.7	<0.005	<0.005	<0.005	<1	2.4	<0.001	<0.0001	43	0.22	5.5	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-009	19-Aug-13	<0.050	<0.001	<0.003	0.083	<0.003	<1	<0.000017	49	<0.001	<0.003	<0.002	<0.2	<0.001	6	<0.005	<0.005	<0.005	<1	1.3	<0.001	<0.0001	20	0.28	4.1	<0.0008	<0.005	<0.005	<0.01	<0.003	0.0058
NOTT-SW-010	19-Aug-13	<0.050	<0.001	<0.003	0.055	<0.003	<1	<0.000017	27	<0.001	<0.003	<0.002	<0.2	<0.001	6.2	<0.005	<0.005	<0.005	<1	2.5	<0.001	<0.0001	39	0.24	5.3	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-010 (lab duplicate)	19-Aug-13	<0.050	<0.001	<0.003	0.055	<0.003	<1	<0.000017	28	<0.001	<0.003	<0.002	<0.2	<0.001	6.2	<0.005	<0.005	<0.005	<1	2.5	<0.001	<0.0001	39	0.24	5.3	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-011	19-Aug-13	<0.050	<0.001	<0.003	0.056	<0.003	<1	<0.000017	37	<0.001	<0.003	<0.002	<0.2	<0.001	6.5	<0.005	<0.005	<0.005	<1	1.6	<0.001	<0.0001	18	0.15	3.4	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
NOTT-SW-011 (lab duplicate)	19-Aug-13	<0.050	<0.001	<0.003	0.056	<0.003	<1	<0.000017	37	<0.001	<0.003	<0.002	<0.2	<0.001	6.6	<0.005	<0.005	<0.005	<1	1.7	<0.001	<0.0001	18	0.15	3.5	<0.0008	<0.005	<0.005	<0.01	<0.003	<0.005
HC-CDWQ [2]																															
Drinking Water		0.1- 0.2 [4] (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	5.0 (MAC)	0.005 (MAC)	-	0.05 (MAC)	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	0.05 (AO)	-	-	-	-	0.01 (MAC)	-	200 (AO)	-		-	-	-	0.02 (MAC)	-	5 (AO)
CCME[3]																															
Freshwater Aquatic Life		0.005 - 0.1 [5]	-	0.005	-	-	(29 [6]) 1.5 [7]	[8]	-	0.0089 (III), 0.001 (VI)	-	[8]	0.3	[8]	-	-	0.073	[8]	[9]	-	0.001	0.0001	-	-		0.0008	-	-	(0.033[6]) 0.015 [7]	-	0.03

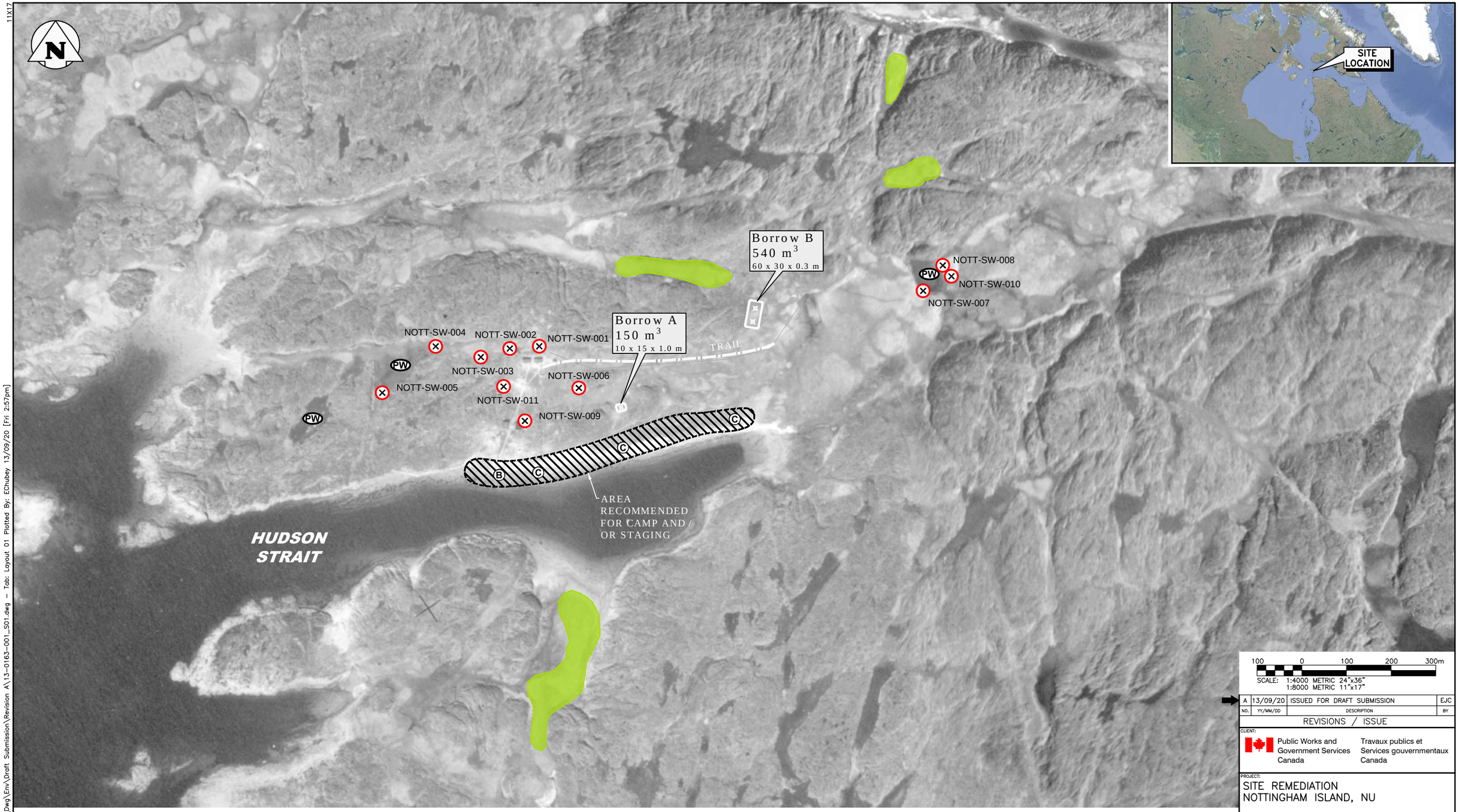
Notes:
"-" = No Data

1. All values are expressed in milligrams per litre (mg/L).
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objectives
   OG - Operational Guideline
3. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated November 2012.
   Guidelines for Canadian Drinking Water Quality.
   Chapter 2 - Community Water (Health Canada - Canadian Drinking Water Quality Guidelines)
4. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants.
   The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
5. Total aluminum should not exceed 0.005 mg/L in waters with a pH below 6.5.
   The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater or equal to 6.5.
6. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
   (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
   These are NOT protective guidelines.
7. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).
8. For the following equations, hardness is expressed as $CaCO_3$ in mg/L and the guideline is in µg/L. **Cadmium** Guideline = 10^{0.86[log(hardness)] - 3.2} µg/L;
   Copper Guideline = e^(0.8545[ln(hardness)]-1.465) * 0.2 µg/L; **Lead** Guideline = e^(1.273[ln(hardness)]-4.705) µg/L; **Nickel** Guideline = e^(0.76[ln(hardness)]+1.06) µg/L
9. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded,
   but TP is more than 50% above baseline values, the potential exists for an environmental impact.

Trigger ranges (µg/L):	ultra-oligotrophic	<4	meso-eutrophic	20-35
	oligotrophic	4-10	eutrophic	35-100

	- Exceedance of HC-CDWQ Criteria
BOLD	- Exceedance of CCME Criteria

FIGURE



LEGEND:

- POTENTIAL BORROW SOURCE NOT INVESTIGATED
- (B) - POTENTIAL BEACH LANDING AREA
- (C) - POTENTIAL CAMP STAGING AREA
- (PW) - POTENTIAL POTABLE WATER SOURCE AREA
- ⊗ - SURFACE WATER SAMPLE LOCATION

NOTT-SW-001

REFERENCE:
REMEDIAL ACTION PLAN,
FORMER WEATHER STATION
NOTTINGHAM ISLAND, NUNAVUT
APRIL 2013, EBA, A TETRA TECH COMPANY

100 0 100 200 300m
SCALE: 1:4000 METRIC 24"x36"
1:8000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
A	13/09/20	ISSUED FOR DRAFT SUBMISSION	EJC

REVISIONS / ISSUE

CLIENT:
Public Works and Government Services Canada
Travaux publics et Services gouvernmentaux Canada

PROJECT:
SITE REMEDIATION
NOTTINGHAM ISLAND, NU

DWG. DESCRIPTION:
OVERALL SITE PLAN WITH SURFACE WATER SAMPLE LOCATIONS

KGS GROUP ENGINEERING
DILLON CONSULTING

DESIGN BY: GRS	DATE (YY/MM/DD): 13/09/19
DESIGN CHECK: EJC	DATE: 13/09/20
DRAWN BY: PEC	DATE: 13/09/19
DWG CHECK: EJC	DATE: 13/09/20

DWG. NO. 13-0163-001 S01 REV: A